Nuisance Flooding Plan for Calvert County

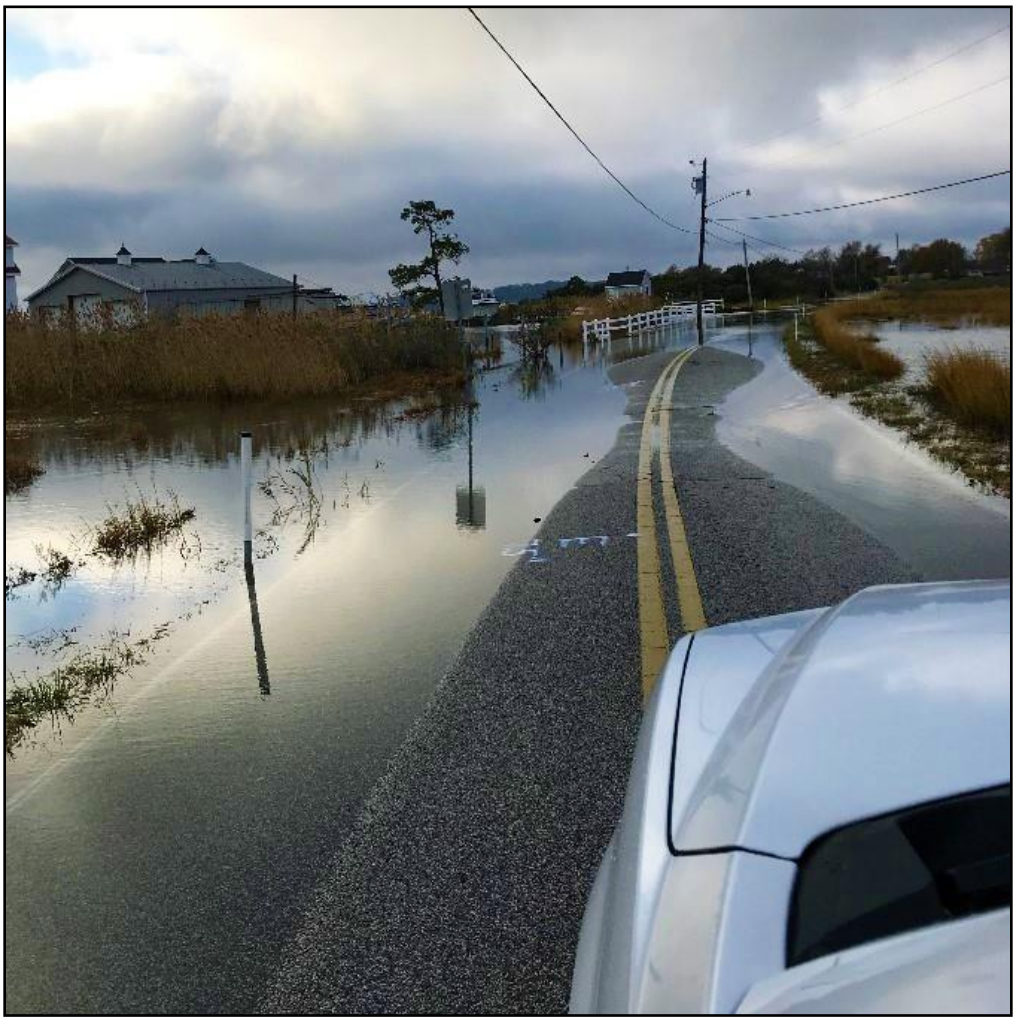

Photo courtesy of the Calvert County Department of Public Works

October 1, 2020

This Nuisance Flooding Plan was prepared by Calvert County's Department of Planning & Zoning with contributions from the Department of Public Works, Department of Public Safety, Department of Parks & Recreation, Soil Conservation District, and the Calvert Marine Museum

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Contents

Background

There is recognition by Maryland lawmakers, local and state governments, and citizens that tidal nuisance flooding is happening with more frequency. Pursuant to the Sea Level Rise Inundation and Coastal Flooding Act (Maryland House Bill 1427 (2019), §3-1018(b) and (c)), on or before October 1, 2020, a local jurisdiction that experiences nuisance flooding shall develop a plan to address nuisance flooding. In addition, a local jurisdiction shall update the plan every five years; publish the plan on the local jurisdiction's website; and shall submit a copy of the plan to the Maryland Department of Planning. The definition of nuisance flooding in accordance with §3-1001 of the Natural Resource Article of the Maryland Annotated Code is "high tide flooding that causes a public inconvenience." This plan has been developed in order to address nuisance flooding in Calvert County. The Towns of Chesapeake Beach and North Beach are municipalities with their own governments and planning and zoning authorities; nuisance flooding issues in these municipalities will not be covered in this plan.

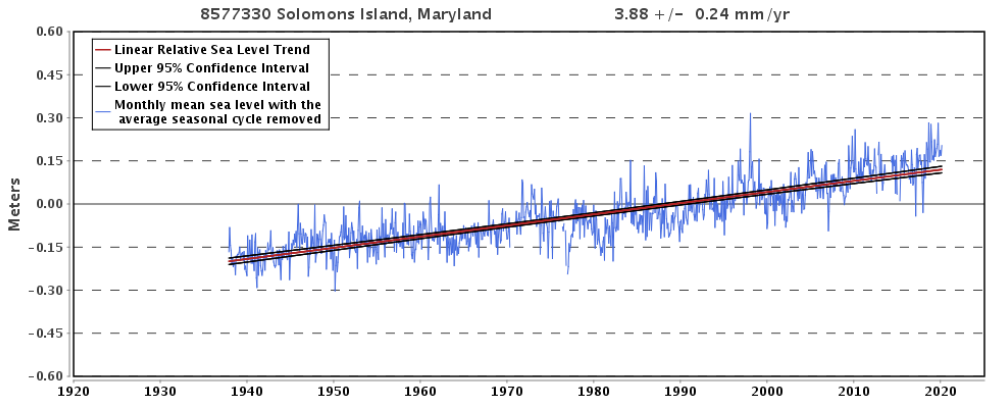
Tidal Flooding

Tidal flooding is sometimes referred to as 'nuisance', 'high tide', or 'sunny-day' flooding and occurs when tidal waters inundate low-lying areas. Some low-lying areas flood every high tide, and some only flood during extreme high tide events. Impacts from tidal flooding that cause public inconvenience include the disruption of access and travel due to the inundation of roadways. Additionally, cultural resources located in coastal communities including historic structures and public parks are often vulnerable to and threatened by increased tidal flooding. Tidal flooding contributes to shoreline erosion and to infiltration and degradation of stormwater systems. Flooding influenced by stormwater will continue to be addressed in county flood mitigation plans and will not be addressed in this plan.

According to the National Oceanic and Atmospheric Administration (NOAA) report, *2018 State of U.S. High Tide Flooding with a 2019 Outlook*, in 2018 the national high tide flooding frequency tied the historical record set in 2015. Tidal flooding was most extensive across the Northeast and broke records within the Chesapeake Bay region. The Mid-Atlantic is particularly susceptible to tidal flooding due to exposure to tropical storms, hurricanes, and nor'easters off the Atlantic coast and the winds associated with them. Strong winds push water in a certain direction and can lead to nuisance flooding when acting concurrently with high tide. In Calvert County, with the Patuxent River to the west and the Chesapeake Bay to the east, the effects of tidal flooding in association with heavy winds will depend on which way the wind is blowing. In addition, the weather patterns accompanying El Niño tend to lead to conditions more conducive for tidal flooding. Astronomical alignments such as a perigee (when the Moon's regular orbit brings it closest to Earth) or during a new or full moon (known as a spring tide) will cause higher than normal tides.

The increasing frequency of tidal flooding can be explained by rising sea levels. In addition to eustatic sea level rise and the thermal expansion of sea water as the earth warms, the Chesapeake Bay region is experiencing land subsidence associated with glacial isostatic rebound. That is, along with climatic forces at play contributing to sea level rise, the land is sinking as well, accelerating the problem. The current sea level trend, measured from 1937 to 2019 at NOAA's tide gauge in Solomons, MD is 3.88 mm/year or 1.27 ft. over 100 years. In addition to increased tidal flooding, sea level rise leads to salt water intrusion which has impacted agricultural lands in the Lower Patuxent River Valley.

Figure 1 Relative Sea Level Trend in Solomons, MD



Source: National Oceanic and Atmospheric Administration

According to NOAA's Center for Operational Oceanographic Products and Services, high tide flooding in Solomons begins at 1.71 ft. above Mean Higher High Water (MHHW). The MHHW level is the average height of the highest tide observed each day over a 19-year period known as the National Tidal Datum Epoch (NTDE). The present NTDE is 1983 through 2001 and is actively considered for revision every 20-25 years.

It should be noted that tidal flooding can create a nuisance even while falling below NOAA's high tide flooding threshold. For example, the Lore Oyster House Museum experiences nuisance flooding so frequently that it must close for a period almost every day it is open. And according to NOAA's Advanced Hydrologic Prediction Service, several inches of water will begin to cover portions of Charles Street at about one and a half feet above MHHW. High tide flooding in areas outside of Solomons may begin at different levels than those experienced in Solomons.

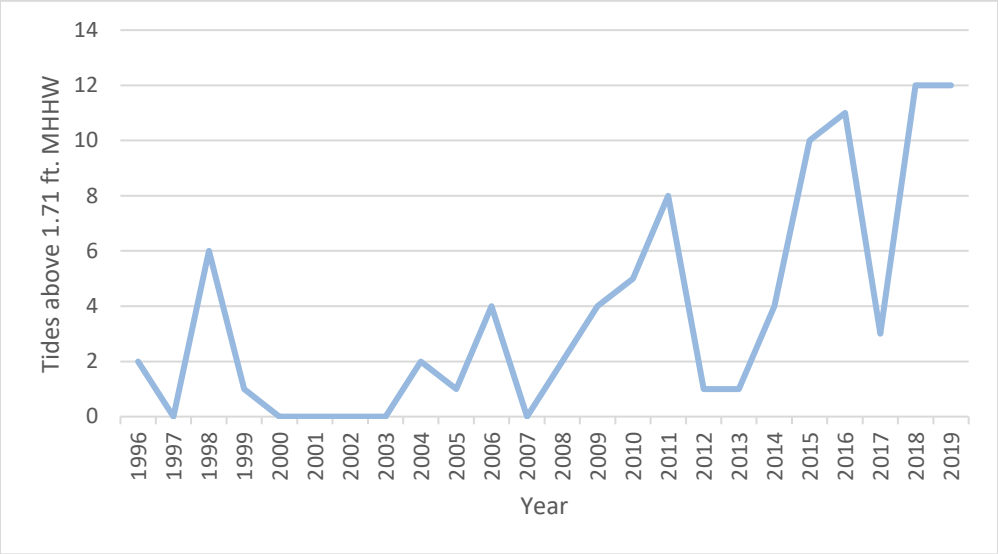
On October 12, 2019 winds associated with Tropical Storm Melissa in concurrence with the Hunter's Moon led to some of the most significant tidal flooding in recent memory in the Chesapeake Bay region. At NOAA's tide gauge in Solomons the highest tide was recorded at 2.77 ft. above MHHW. The center of Tropical Storm Melissa was roughly 480 nautical miles off shore in the Atlantic Ocean at the time[1].

Trends

Records at NOAA's tide gauge in Solomons were reviewed over a 24-year period from 1996 through 2019 to see if there is trend in the frequency of high tides above the 1.71 MHHW threshold. As can be seen in Figure 2, there is an increasing trend in the frequency of high tides above the threshold. Prior to 2015, there were only two years when more than five tides were recorded above the threshold (six in 1998 and eight in 2011). Since 2015, four out of five years have seen tides recorded above the threshold at least ten times peaking at twelve recordings in 2018 and 2019.

[1] National Hurricane Center Tropical Cyclone Report. "Tropical Storm Melissa". National Oceanic and Atmospheric Administration. National Weather Service. 2019

Figure 2 Tides Recorded Above the High Tide Flooding Threshold in Solomons, MD



Source: NOAA Tide Gauge in Solomons, MD[2]

Roads

The inundation of roadways by tidal waters in low lying coastal areas is one of the most common ways the public is affected by nuisance flooding. According to the Federal Emergency Management Agency (FEMA) six inches of water will reach the bottom of most passenger cars causing a loss of control and possible stalling, and a foot of water will float many vehicles. Flooded roads can obstruct commutes and school bus access, close or harm businesses, and prevent emergency vehicles from being able to respond. In Calvert County, the three roads most vulnerable to tidal nuisance flooding are Chaneyville Road at the bridge over Graham Creek, Charles Street in the area adjacent to Back Creek on Solomons Island, and the Broomes Island Road Causeway.

The Calvert County Department of Public Works Highway Maintenance Division (DPW HMD) closely monitors high tides and road conditions. In addition to following tide forecasts, there are several locations in the field where water levels are observed. In these locations a stake has been placed in an area a few feet off shore in tidal waters. Depending on the tide cycle and where the water is relative to level lines marked on the stake, a prediction can be made whether travel will become difficult. In such cases DPW HMD will close the road if water levels are expected to reach a point where travel becomes potentially hazardous to the public. At this time DPW HMD has not seen an expansion of tidal flooding from the historically vulnerable areas. There may be a minor upswing in the occurrence rate, but not to a degree considered excessive. Something county government could look into if funds are available is the installation of automated high-water warning signs. These are signs that are solar powered and can detect the water level. When water approaches a certain level, the sign will flash a high-water warning.

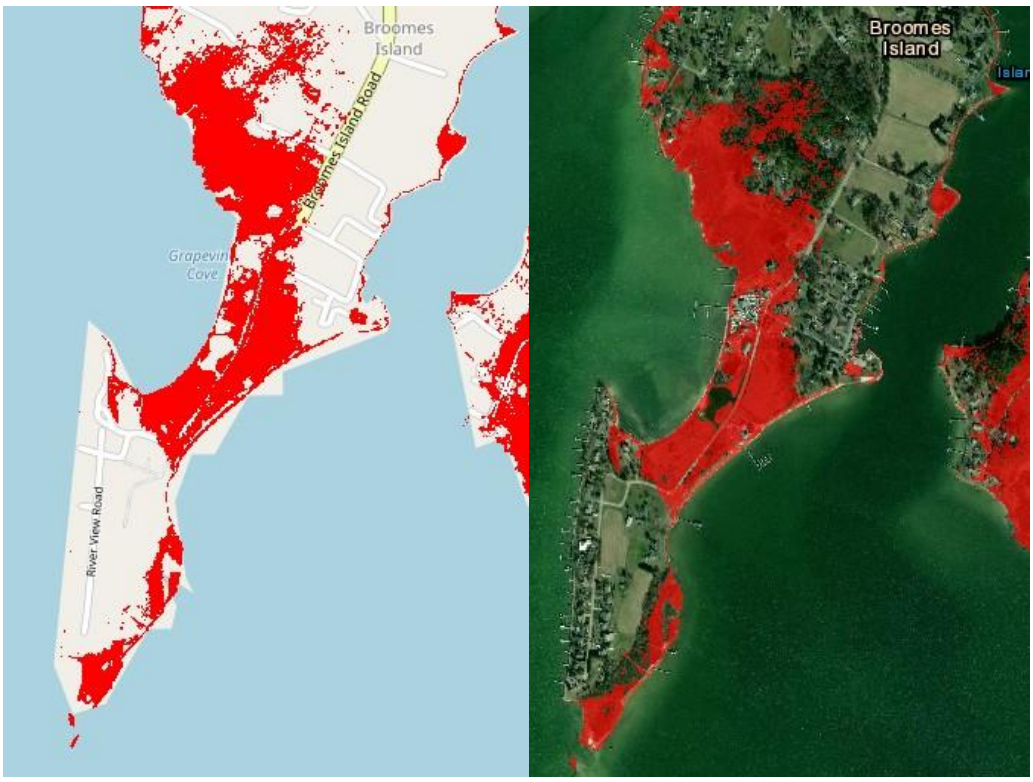
[2] NOAA tide gauge data for Solomons was not available from mid-October 2013 to mid-April 2014 so in those years high tides above the threshold may be underreported

Broomes Island Road

Broomes Island is located on the western shore of Calvert County along the Patuxent River. Broomes Island is in actuality a peninsula, when the tides and weather cooperate. Near the center of the peninsula there is an area of wetlands approximately 1,500 feet in length which also functions as a land bridge connecting the 33 residences at the end of the peninsula with the rest of the county. The Broomes Island Road Causeway runs through these wetlands and is one of the areas most vulnerable to tidal flooding in the county. During instances where flood waters have inundated the roadway, the end of the peninsula temporarily becomes an island and access is cut off from the rest of the county.

During the development of the *Broomes Island Flood Mitigation Plan (2016)*, Calvert County DPW looked into flood mitigation options for Broomes Island Road. It was recommended to consider elevating the Broomes Island Road Causeway and a contiguous section of Broomes Island Road to the north by 4.5 feet over a length of 5,926 feet. The plan stated that this undertaking would alleviate tidal nuisance flooding as well as flooding associated with many prolonged rain events and would have an estimated cost of $1.5 million not taking into account reviews, studies, and permits required by state and federal agencies which would need to be determined and factored into the total amount. However, upon further review by DPW this initial projected cost is likely to be an underestimation. In addition to expense, the complications associated with such a project which would likely include the acquisition of private property as well as the disturbance of wetlands could make implementation a challenge.

Figure 3 High Tide Flooding Maps for Broomes Island



Note: Red layer represents the approximate areas high tide flooding occurs
Source: NOAA's Sea Level Rise Viewer

Figure 4 Tidal Flooding on Broomes Island Road

Caption: Photo was taken around 2:30 pm on April 5, 2020. High tide was recorded at 1:17 pm at 1.7 feet above sea level. There was about 4.5 inches of water above the centerline at the two lowest points. A Coastal Flood Warning from the National Weather Service was in effect that day. Photo courtesy of the Calvert County Department of Public Works

Living Shorelines

Living shorelines are a form of green infrastructure typically consisting of native vegetation, stone, sand fill, or other organic and structural materials and are considered an adaptation tool to sea level rise by the Maryland Commission on Climate Change. Living shorelines are designed to reduce wave energy, trap sediment, and filter runoff while maintaining or increasing the beach and/or coastal habitat. Hard shoreline structures like seawalls, bulkheads, and revetments serve as a fixed barrier between land and coastal environments. These practices can limit the impacts of flooding but also disrupt natural processes. The use of living shorelines as opposed to hard shorelines is preferred by the Maryland Department of Natural Resources. Living shorelines function more to stabilize shorelines and reduce the rates of erosion, but in flood-prone areas with the right physical conditions, living shorelines can help control flood waters by storing them and allowing a slow release back into the Chesapeake Bay, Patuxent River, or groundwater. The effects of living shoreline projects on erosion and flooding in the county is something that could be studied.

Figure 5 Living Shoreline at Jefferson Patterson Park and Museum

Caption: Living shoreline practices have been used at Jefferson Patterson Park and Museum; a part of the Maryland Historical Trust. The living shoreline shown above includes a segmented stone breakwater with marsh plantings shoreward of the breakwater and is built near and parallel to the shoreline to reduce wave energy on the land side of the structure. Source of the photo is the Jefferson Patterson Park & Museum

Breezy Point Beach and Campground

Breezy Point Beach and Campground includes approximately two thousand feet of bayfront beach and is operated by the Calvert County Department of Parks & Recreation. In addition to a considerable beach area the property includes a fishing pier, trailer sites, playground, volleyball courts, concession stand, and a large shaded picnic area. However, the park's exposure to the Chesapeake Bay makes it vulnerable to tidal nuisance flooding. Future projects serving Breezy Point Beach highlighted in in the *Calvert County FY 2021 Program Open Space Annual Program* include protective breakwaters, beach nourishment

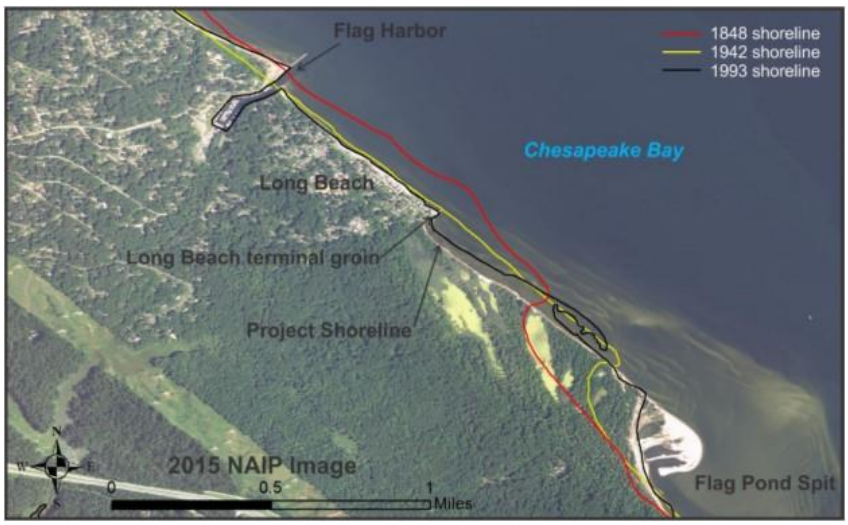
(replenishing of sands or increasing the area of the beach), drainage improvements, and the replacement of a seawall in the campground. The planting of native vegetation is included in the proposed shoreline re-establishment project.

Flag Ponds Nature Park

Flag Ponds Nature Park is located along the Chesapeake Bay shoreline and is operated by the Calvert County Department of Parks & Recreation Natural Resources Division. The park is a state designated Natural Heritage Area and is well known for its beaches, nature trails, and views of the Calvert Cliffs. The trails, boardwalk, and roadway leading to the beach are frequently inundated with tidal flooding. Wooden walkways and bridges along the Lower North Ridge Trail have been expanded to allow access for hikers during these nuisance flooding events. The Flag Ponds shoreline is eroding at rates exceeding six feet per year and this process is aggravated by tidal flooding. Ultimately, this erosion will continue to eat away at the adjacent wetlands and public beaches if left unprotected.

The Department of Parks & Recreation Natural Resources Division plans to construct a living shoreline using segmented stone breakwaters, beach nourishment, and to the greatest extent possible, wetland plantings. This project will reduce erosion by protecting 500 linear feet of shoreline and creating 10,000 square feet of critical beach habitat. The proposed living shoreline project will be on county-owned property adjacent to the Long Beach community; the park neighbors have shown an interest in working with Calvert County Government to solve the flooding and erosion problems in this area. The completed project would be a demonstration site for other communities to learn about the benefits and functions of similar projects. The location, a county-owned shoreline and park, was identified by residents of the Long Beach community and evaluated by county and state representatives as a high priority shoreline erosion project. More information on the Flag Ponds Living Shoreline Project can be found online at https://www.calvertcountymd.gov/2167/Living-Shoreline-Project.

Figure 6 Shoreline change through time at Flag Ponds Nature Park



Note: Hard structures like groins and the Flag Harbor jetties shown above, can entrap sand on the updrift side while contributing to increased erosion on the downdrift side
Source: Flag Ponds Living Shoreline Project Permit Report

Cultural Resources

The Calvert County Comprehensive Plan adopted in 2019 has a stated goal to "Identify, protect, and interpret the buildings, places, and archaeological sites that signify the heritage of the community." (Chapter 5, Goal 1)

In support of this goal is the objective to "Promote the documentation and protection of Calvert County's heritage." Two of the actions specified are especially relevant here:

> 5.1.1.7 Research and develop strategies to mitigate the effects of environmental threats to cultural resources.
>
> 5-6 5.1.1.8 Ensure adequate support of programs for the documentation of threatened sites and structures and for the publicizing of strategies and incentives that would encourage preservation of threatened resources.

The Calvert Peninsula was home to Native Americans for thousands of years with the first English settlers arriving by the 1650's. Maps show that, since the late 17th century, some Calvert County shorelines have receded more than one hundred feet, taking archaeological sites and standing structures with them. In recent years the rate of erosion and flooding has increased the threat to cultural resources in flood-prone areas. In order to address the threat, staff seeks to identify, evaluate, and prioritize mitigation options for archaeological sites and historic structures.

Identification and Evaluation

Calvert County Department of Planning & Zoning staff have identified recorded historic structures and archaeological sites that are currently affected by flood events, shown in the tables below.

Table 1 Effects of Higher Water Levels Due to Coastal Flooding, based on analysis from 2017:

Rise in Water Level	**0-2 feet**	**5 feet**	**10 feet**
Archaeological Sites	*44*	*69*	*105*
Buildings	*3*	*24*	*105*

Table 2 Effects of Hurricane Storm Surge, based on analysis from 2017:

Hurricane Category	**1**	**2**	**3**	**4**
Archaeological Sites	*27*	*74*	*104*	*128*
Buildings	*18*	*65*	*145*	*180*

Some sites and structures are already on or under water, such as historic wharves and landings. In those cases, the metrics do not apply and further coastal flooding and storm surge will further impact the resource. The sites included in the tables have been recorded in the Maryland Inventory of Historic Properties (MIHP) and/or the Maryland Archeological Site Survey (MASS), but there has been no comprehensive survey of cultural resources. So there are structures and archaeological sites that are still unidentified and undocumented.

Flood-proofing

For historic structures, one potentially effective flood mitigation measure is flood-proofing. The dry flood-proofing technique involves using measures to seal a building to prevent flood waters from entering it. Walls are coated with waterproofing compounds or plastic sheeting and openings such as doors, windows, and vents are closed, either permanently, with removable shields, or with sandbags. Examples of dry flood-proofing modifications include the following:

- Installing watertight shields or floodgates over doors and windows
- Reinforcing walls to withstand floodwater pressures and impact forces generated by floating debris
- Using membranes and other sealants to reduce seepage of floodwater through walls and wall penetrations
- Installing drainage collection systems and sump pumps to control interior water levels, collect seepage, and reduce hydrostatic water pressures on the floor slab and walls
- Installing backflow valves to prevent the entrance of floodwater or sewage flows through utilities
- Anchoring the building to resist flotation, collapse, and lateral movement

Advantages

- The appearance of the building is not altered significantly
- It is appropriate for buildings on concrete slab floors
- It is recommended where floodwaters are less than three feet and slow moving or for buildings that are too expensive to elevate (e.g., a slab building)

Disadvantages

- The waterproofing compounds can deteriorate over a period of time
- It is dependent on human action for the installation of closures on windows and doorways
- It cannot be used if the structure has a basement
- It is only permitted for non-residential structures

Wet flood-proofing allows floodwaters to enter the building and rise with the water on the outside then drain in the same way. This lessens strain on the structure when it is impossible to keep the water out by other methods. However, wet flood-proofing is only practical in a limited number of situations, such as non-living spaces in some historic structures. Lastly, it should be noted that historic structures built prior to the adoption of the floodplain ordinance are exempt from floodplain management requirements.

Cove Point Lighthouse and Keeper's House

The Cove Point Lighthouse was constructed in 1828 and is the oldest continuously operating lighthouse on the Chesapeake Bay. Throughout its history the keepers of the lighthouse have worked persistently to mitigate against the natural forces of the bay. The earliest reference to erosion was in 1831 and by the 1840's a wooden breakwater and groin field were constructed around the keeper's house and tower. In 1913 a reinforced concrete seawall was constructed, which was rebuilt in 1993[3]. Ownership of the Cove Point Lighthouse and Keeper's House was transferred from the U.S. Coast Guard to Calvert County Government in 2000 and the property is administered by the Calvert Marine Museum (the Coast Guard continues to operate the aids-to-navigation functions of the lighthouse). The county installed a sump pump in the keeper's house after it was flooded with tidal water from Tropical Storm Isabel in 2003 and it currently provides adequate flood mitigation. However, this site is vulnerable to sea level rise and increased tidal flooding. At some point in the future, elevation of the keeper's house is an option that could be explored.

Figure 7 Flooding at the Cove Point Lighthouse and Keeper's House

Caption: This photo of tidal waters at the Cove Point Lighthouse and Keeper's House was taken after Tropical Storm Isabel hit Calvert County in 2003. Photo courtesy of the Calvert Marine Museum

[3] Dodds, Richard J (Winter 1997/1998). "Cove Point Lighthouse: Sentinel on Calvert's Cliffs". Bugeye Times.

Lore Oyster House

Figure 8 Flooding at the Lore Oyster House

Caption: The Lore Oyster House Museum experiences nuisance flooding so frequently that it must close for a period almost every day it is open. Photo courtesy of the Calvert Marine Museum

The Lore Oyster House was constructed in 1934 following the destruction of the previous company building in the Chesapeake-Potomac Hurricane of 1933. Of all the oyster-packing companies operating along the Patuxent River between 1867 and 1984, the Lore Company possessed the second largest and the longest continually operating plant. Few oyster houses from this period have survived essentially unaltered. The Calvert Marine Museum acquired the property in 1979 after the Lore Company ceased business. The oyster house was built on top of "new land" created by oyster shell fill from previous operations. Concrete walls were used in order to minimize flood damage to the building. The concrete slab floors required frequent cleaning by water hose and have sloping surfaces for self-draining[4]. Today, water from Back Creek enters the building through this floor drain at high tide.

The county investigated flood-proofing the Lore Oyster House, potentially utilizing FEMA's post-disaster declaration grant funds, which include a 25 percent cost-share. The installation of a one-way valve would mitigate some of this flooding. Installation of floodgates at doors and sealing the foundation areas could mitigate additional flooding that enters from tidal waters surrounding the building. At this time, it is not known precisely how much of the flooding can be attributed to water coming up through the floor drain and how much can be attributed to water entering the building from the outside. One way to determine this would be to sandbag the building and observe how it affects the flooding. Presently, there are some days where floodwaters inside the building are two and a half feet or higher. While tidal flooding impacts the ability of visitors to tour the oyster house, it is not structurally compromising and the stability of the building is not in question.

[4] Eshelman, Ralph (August 26, 1993). "National Historic Landmark Nomination: J.C. Lore Oyster House/ J.C. Lore and Sons, Inc., Seafood packing Plant". National Park Service.

Archaeological Sites

Threats to archaeological sites cannot be assessed merely by reference to projected inundation levels. Ongoing erosional processes in addition to increases in wave height owing to rising sea levels and subsidence of the land make sites far above surface water susceptible to loss. The action of the water and wind on the shore tends to undercut the shoreline which then becomes unstable and slumps onto the beach only to have the process repeat. To date, shore erosion inhibiting actions such as hardened or living shorelines and archaeological data recovery are the principal means of mitigating threats to archaeological sites.

Figure 9 Erosion at the Calverton Archaeological Site

Caption: Archaeological sites erode out of banks along the waterways in Calvert County. Photo courtesy of the Calvert County Department of Planning & Zoning

Site Stewardship and Monitoring

Monitoring is necessary to track damage to and loss of archaeological sites and negative effects on historic structures. Monitoring may be accomplished in at least two ways:

1. Enlist and train property-owners to inspect shorelines after storm events or unusually high tides and document erosion and impact on known archaeological sites as well as exposure of unrecorded sites.

2. Establish and train a volunteer corps to conduct regular inspections after storm or flooding events.

In both scenarios, the county cultural resource planner (archaeologist and/or historic preservation specialist) would develop a standard of documentation and receive the information from the landowners and/or volunteers. A site stewardship program would depend heavily on volunteer labor, private-property owner cooperation, and county management of findings.

Prioritize and Mitigate

When threatened structures and archaeological sites are identified, cultural resources professionals on county staff will make the determination of significance and priority for mitigation, in consultation with the Maryland Historical Trust as needed. Staff will use standard criteria for significance but will give primacy to rare structures and sites, as well as sites and structures that are important to local communities and local heritage.

Most threatened structures and sites, with a few exceptions, are on private property. Grant funds may be available to assist property owners with elevation or relocation of historic houses when appropriate, and some may be available to address the cost of protecting archaeological sites. Both kinds of resources should be prioritized in advance of a major flood event to simplify the difficult choices that face both property owners and county government that has limited human and financial resources to respond.

Reporting

Calvert Prepare is an interactive app designed to give county residents, businesses, and visitor's access to emergency information and preparedness guidance. One of many features currently available on the app is the ability to submit a damage report for severe weather, storm damage, power outages, and other incidents. In these reports the user can submit up to three pictures and is required to provide information including the address, date, and time of the incident while having the option to write additional information. During the development of this plan the Calvert County Department of Planning & Zoning (DPZ) and the Calvert County Department of Public Safety Emergency Management Division (DPS EMD) proposed adding a nuisance flooding report feature to the Calvert Prepare app. How this new reporting feature would be designed is yet to be determined, but the goal would be to allow county government to better understand the extent and frequency of nuisance flooding. This data would be reviewed periodically by DPS EMD and DPZ and reviewed again prior to the update of this plan in five years.

Conclusion

In the Maryland Commission on Climate Change's report, *Sea-Level Rise Projections for Maryland in 2018*, it states that the likely range (66% probability) of the relative rise in mean sea level expected in Maryland between 2000 and 2050 is 0.8 to 1.6 feet, with about a one-in twenty chance it could exceed 2 feet. According to NOAA's report, *2019 State of U.S. High Tide Flooding with a 2020 Outlook*, by 2030 the national high tide flooding frequency trend is likely to further increase about two to three times under current floodplain management practices. In 30 years, current high tide flooding could become the typical high tide in some places. As sea levels continue to rise and the frequency of tidal flooding increases, decisions will have to be made with the acknowledgement of these realities. In accordance

with guidance developed by a multi-partner workgroup facilitated by the Maryland Department of Natural Resources, this *Nuisance Flooding Plan for Calvert County* has sought to create a baseline inventory of areas where tidal nuisance flooding occurs, identify flood thresholds, water levels, and conditions that lead to tidal nuisance flooding, and propose a mechanism to document tidal nuisance flooding events. Issues concerning stormwater in conjunction with tidal flooding have been addressed in small area plans such as the *Cove Point Flood Mitigation Plan* and the *Broomes Island Flood Mitigation Plan* and will be further addressed in the *Calvert County Flood Mitigation Plan* update as well as additional community flood mitigation plans.

Figure 10 Lore Oyster House on Solomons Island

Photo courtesy of the Calvert County Department of Planning & Zoning

Appendix

Inventory of Areas Vulnerable to Tidal Nuisance Flooding

Roads

- Chaneyville Road at the bridge over Graham Creek near Lower Marlboro
- Charles Street in the area adjacent to Back Creek on Solomons Island
- Broomes Island Road Causeway
- Beach Drive in Neeld Estate

Cultural Resources (County Parks)

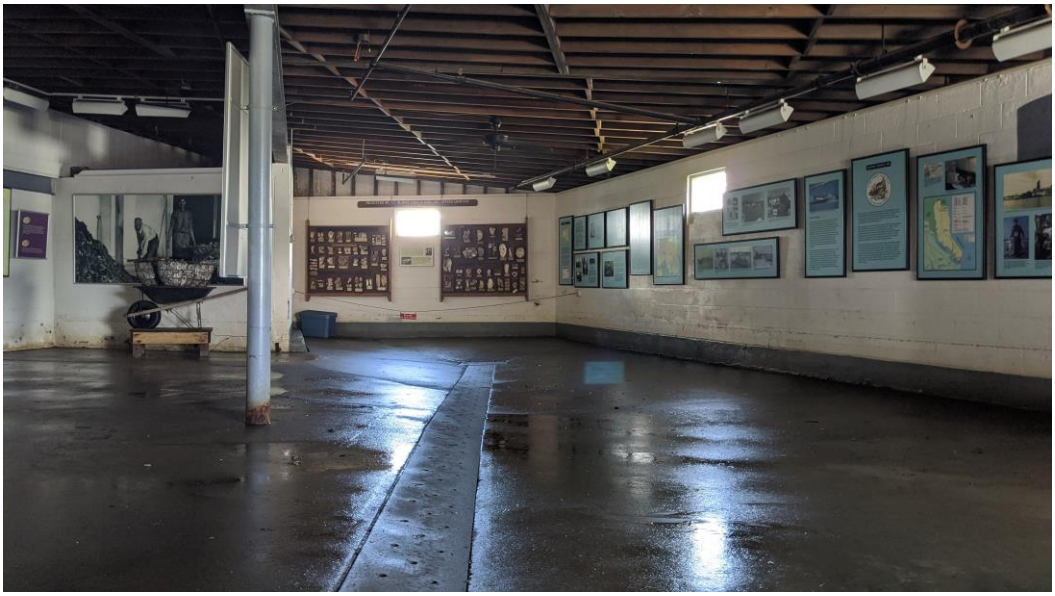
- Breezy Point Beach and Campground
- Flag Ponds Nature Park (at the north end adjacent to Long Beach as well as low lying areas by the Fishing Shanty and the Beach Bathrooms)

Cultural Resources (Historic)

- Cove Point Lighthouse and Keeper's House
- Lore Oyster House
- Calverton Archaeological Site

Lore Oyster House

Figure 11 Inside the Lore Oyster House



Caption: In this photo taken inside the Lore Oyster House the floor drain described previously is visible in the center of the room. Photo courtesy of the Calvert County Department of Planning & Zoning

Flag Ponds Nature Park

Figure 12 Historical Shorelines Map at Flag Ponds Nature Park

HISTORICAL SHORELINES MAP

$$\frac{\text{2011 shoreline (base aerial)} - \text{1848 shoreline (blue)}}{\text{163-year period}}$$

$$\text{Average Annual Rate of Erosion} = \frac{\text{840-ft. of shoreline recession}}{\text{163-year period}} = 5.1 \text{ ft./yr.}$$

$$\frac{\text{1993 shoreline (yellow)} - \text{1942 shoreline (red)}}{\text{51-year period}}$$

$$\text{Average Annual Rate of Erosion} = \frac{\text{310-ft. of shoreline recession}}{\text{51-year period}} = 6.1 \text{ ft./yr.}$$

Source: The Calvert County Department of Parks & Recreation

Calverton

Figure 13 1682 Survey Plat of Calverton Shown Over a Modern Aerial

Source: The Calvert County Department of Planning & Zoning

The Calverton Site is among the most significant historic archaeological sites in Calvert County. In 1669 Lord Baltimore ordered that towns should be laid out in every county of the province to encourage trade. William Berry, who owned a large tract of land on Battle Creek, offered twenty acres to be designated as town land and to serve as the first county seat. The shoreline there featured a deep natural harbor and some protection from the winds and water on the Patuxent River. Lord Baltimore then directed Charles Boteler, deputy surveyor of Calvert County to survey the land and lay out the town.[5] If the original survey survives, it has not been found. What does remain is the plat of Calverton--also known as Battle Town and Calvert Town--drawn by Robert Jones in 1682 following a land dispute between William Berry and Michael Taney.

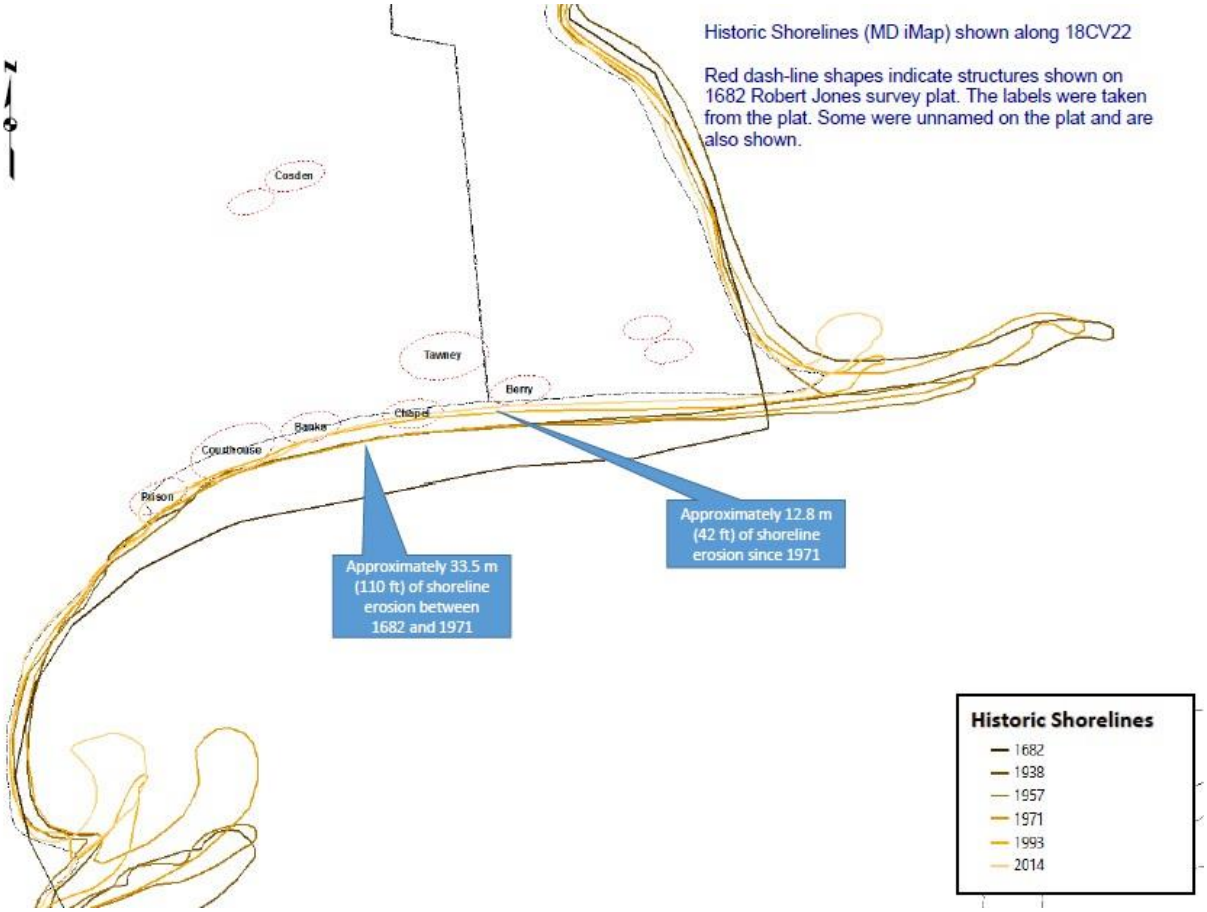
The 1682 town plat shows several public buildings including a courthouse, prison, and chapel, along with dwellings and outbuildings. The town was abandoned sometime after the courthouse and county seat were relocated to Prince Frederick in 1724. The former town site has since been converted to farmland after falling into disuse. In the ensuing years Battle Creek has pummeled the former waterfront at

[5] Archives of Maryland Vol. VII, p.279

Calverton with an estimated loss of more than 50 meters of shoreline. Archaeologists registered the 1682 plat on modern aerials of the property to show that several of the buildings are completely gone, including the prison. However, the overlay shows several buildings still located entirely on land and a couple of buildings partially eroded on the current shoreline.

Three archaeological investigations at the property since 2017 uncovered important evidence from structures shown on the 1682 plat in addition to a few buildings that must have been built later in the 1680s or 1690s. They are all threatened by continued shoreline erosion, as are sites from all eras in Calvert County's past.

Figure 14 Historic Shorelines at Calverton

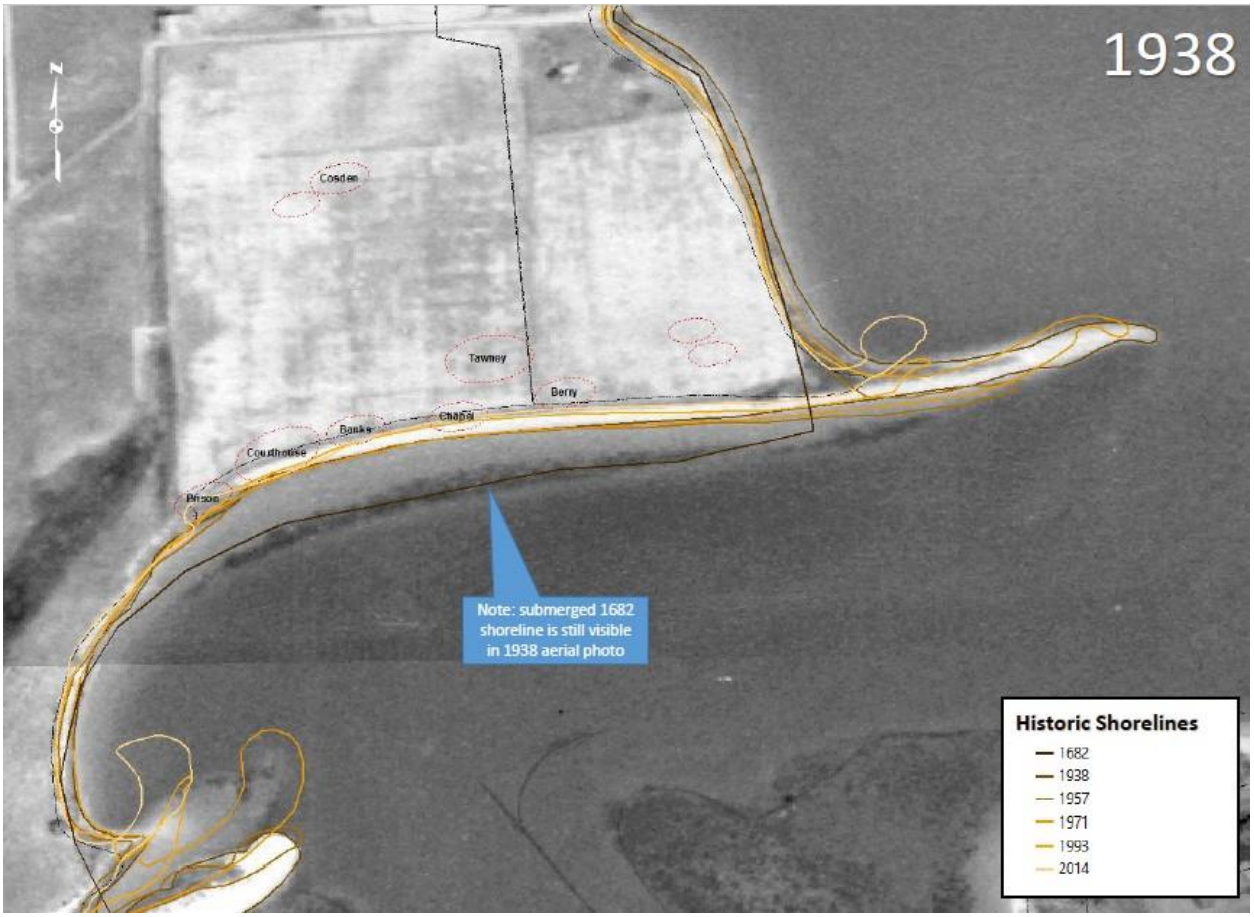


Source: The Calvert County Department of Planning & Zoning

Figure 15 Historic Shorelines at Calverton 1682 Map

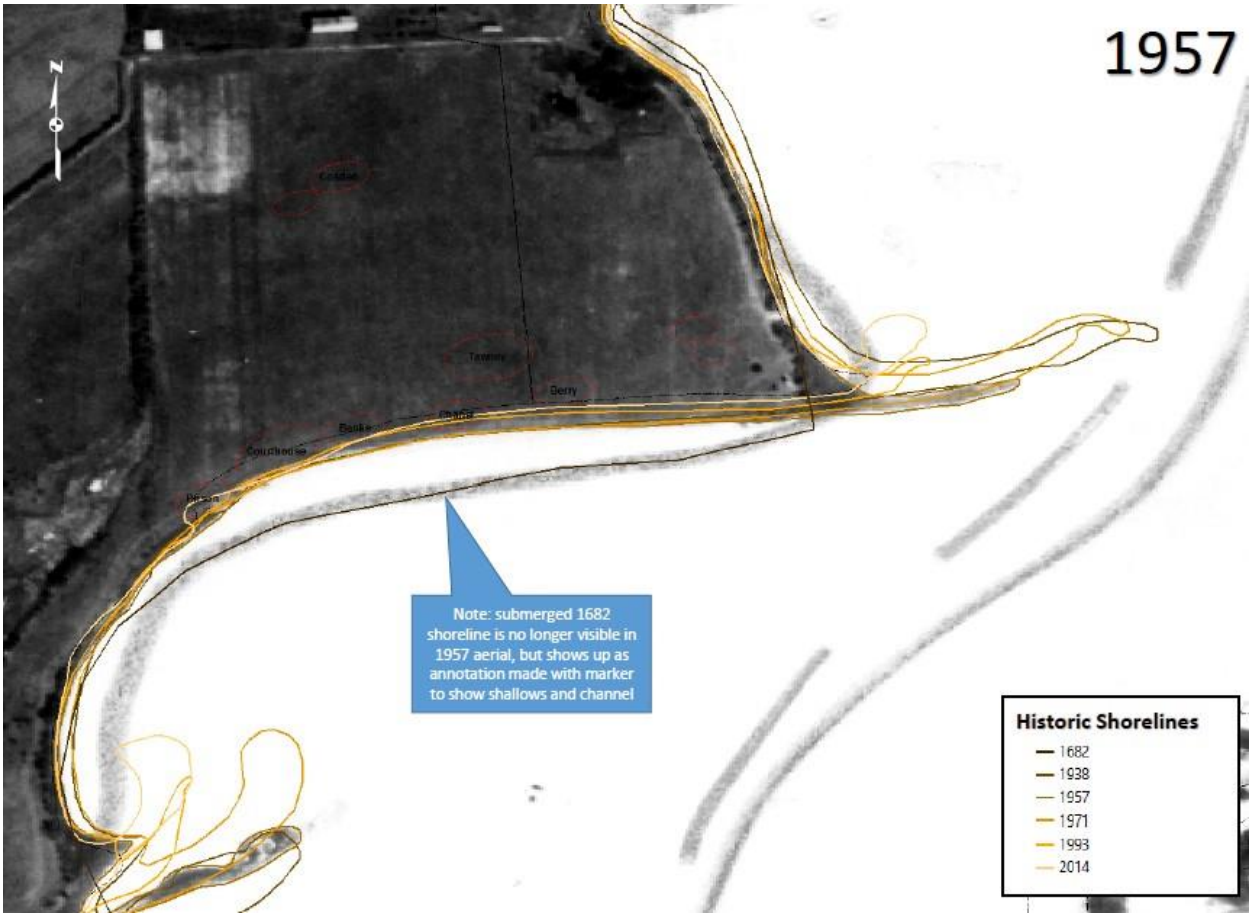
Source: The Calvert County Department of Planning & Zoning

Figure 16 Historic Shorelines at Calverton 1938 Aerial



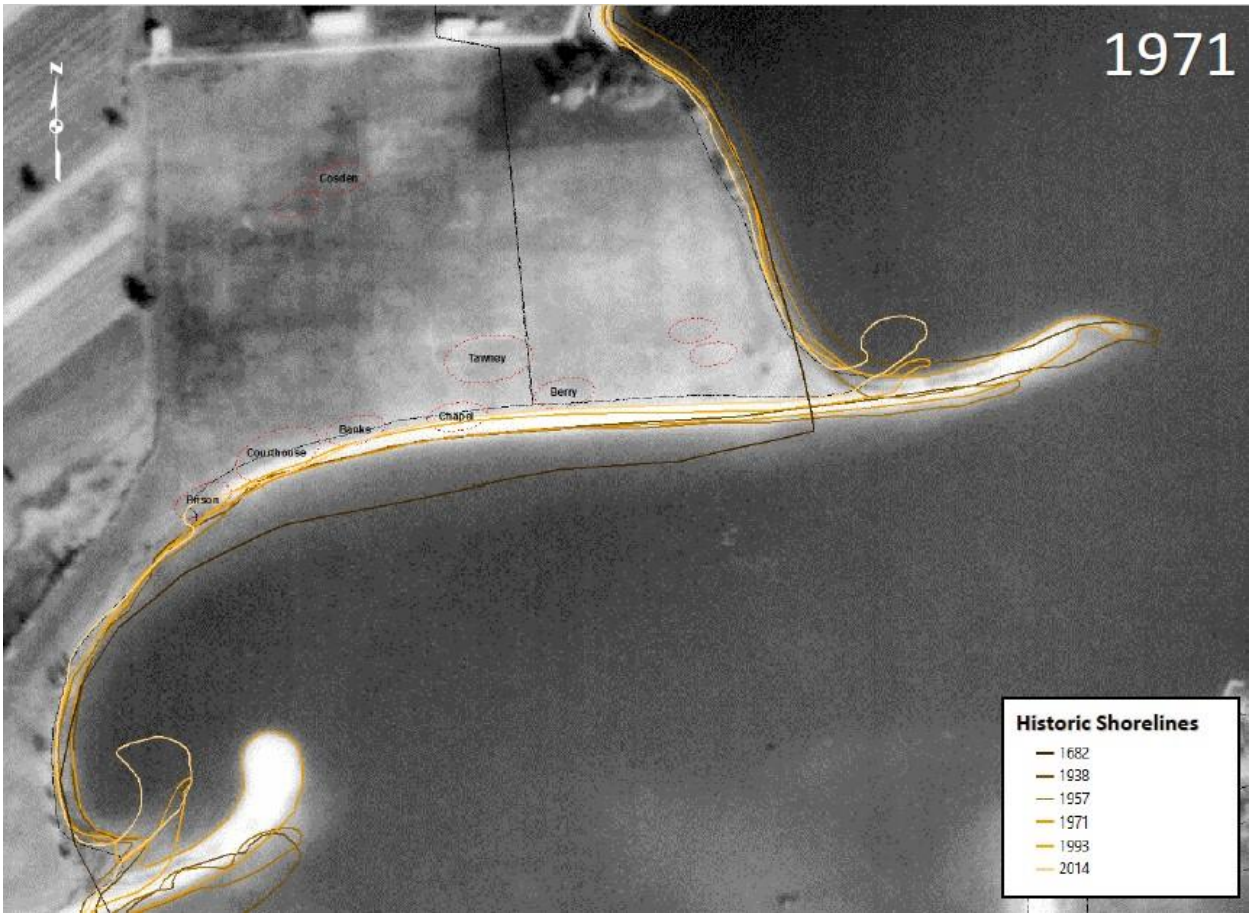
Source: The Calvert County Department of Planning & Zoning

Figure 17 Historic Shorelines at Calverton 1957 Aerial



Source: The Calvert County Department of Planning & Zoning

Figure 18 Historic Shorelines at Calverton 1971 Aerial



Source: The Calvert County Department of Planning & Zoning

Figure 19 Historic Shorelines at Calverton 1993 Aerial

Source: The Calvert County Department of Planning & Zoning

Figure 20 Historic Shorelines at Calverton 2014 Aerial

Source: The Calvert County Department of Planning & Zoning